

# **EPA MOVES Greenhouse Gas RunSpec GUI Details**

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Assessment and Standards Division  
Office of Transportation and Air Quality  
U.S. Environmental Protection Agency

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# EPA MOVES Greenhouse Gas RunSpec GUI Details

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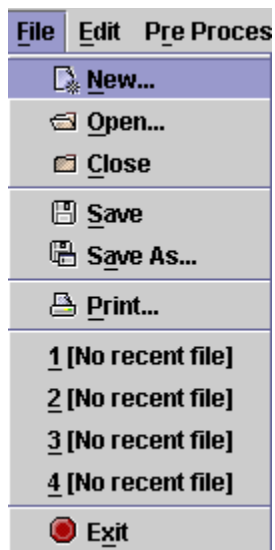
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## 1. Introduction

This document describes the MOVES Design Team's detailed design of the GUI used to setup a MOVES Run Specification ("RunSpec") for the Greenhouse Gas version of MOVES. This document is based upon the previous, more general, document "MOVES RunSpec GUI Details r3.doc"

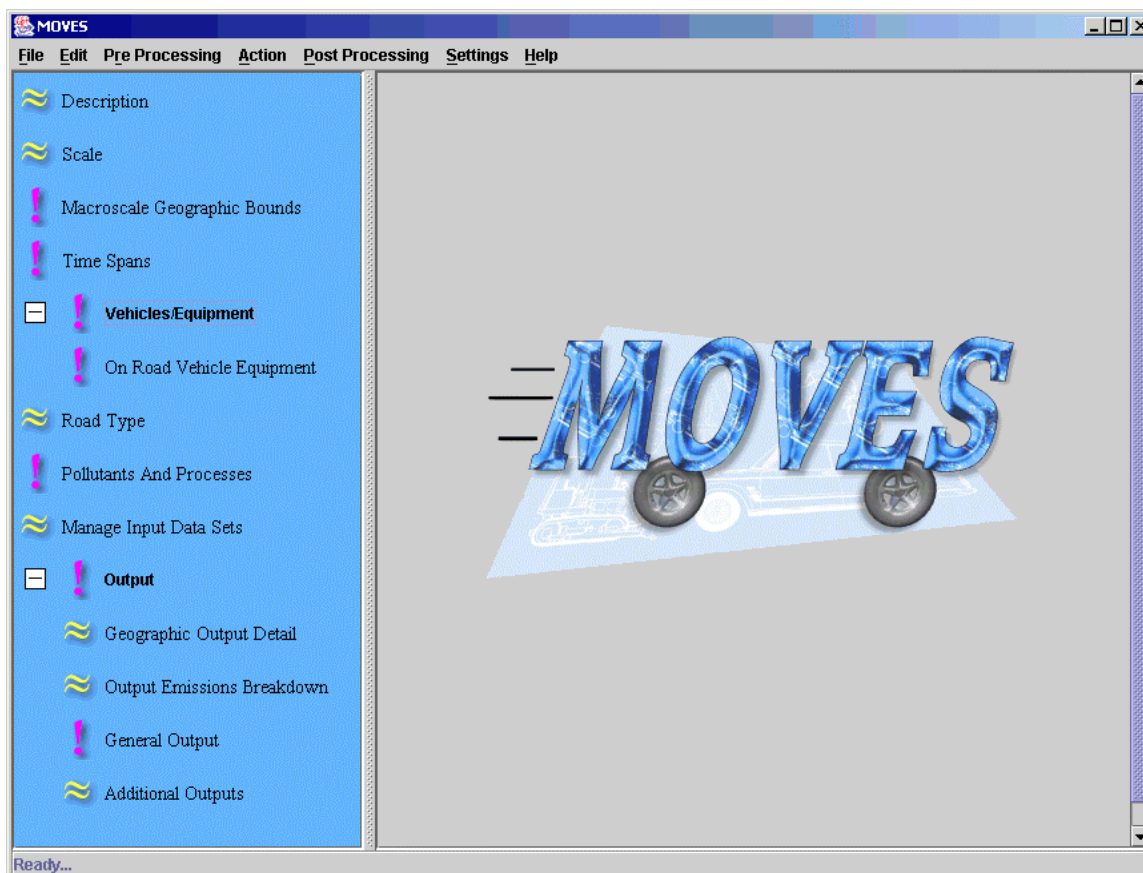
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## 2. RunSpec UI Overview



The RunSpec UI has a top-level menu with several options for a RunSpec file. The options are typical of those used when manipulating documents: New, Open, Close, Save, Save As, and Exit. They allow RunSpec objects to be created, loaded from disk, and saved to disk.

When editing a RunSpec object, the RunSpec UI appears--typified by the display shown below. This UI is shown below the top-level menus just as documents are shown in other standard programs such as Excel, Word, and WordPerfect.



The UI shown previously is conceptually split into two halves: the navigation list (in blue on the left) and the detail panel on the right. Selecting an item from the navigation list will place that item’s detailed UI into the right hand side. The detail panels are shown in the following sections.

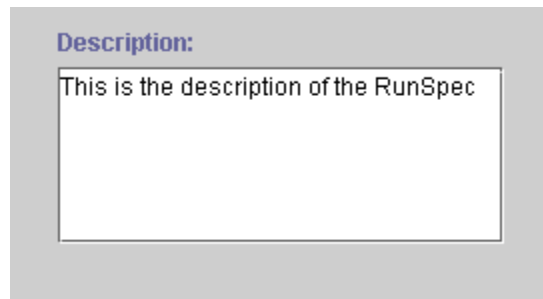
The RunSpec navigation list depicts a tree-like structure of areas of the RunSpec’s information. Some sections, such as “Vehicles/Equipment” and “Output”, contain subsections. These sections are shown with an icon (+ or -) that allows a list of subsections to be expanded or collapsed.

RunSpec navigation list items are shown with an icon that indicates the completeness of the RunSpec in that section, as shown in the table below:

Icon	Meaning
!	Needs additional user supplied data.
✓	Sufficiently filled in to run.
≈	Default data present, but otherwise sufficiently filled in to run.
[-]	Tree close/expand

Note the icons shown on the sample UI in this document are not necessarily indicative of which sections/subsections will have default data available.

### 3. Description



The screenshot shows a gray rectangular area representing the RunSpec GUI. At the top left of this area, the word "Description:" is written in a blue, sans-serif font. Below this label is a white rectangular text box with a thin black border. Inside the text box, the text "This is the description of the RunSpec" is written in a black, sans-serif font. The text box is currently empty except for this text, and there is no visible cursor.

Every RunSpec can have a description, which is a free form block of user-supplied text. This text can be up to 5000 characters in length.

The default description is blank and the model can be run without a description.

## 4. Scale

**Scale:**

☒ **Macroscale** - Simulation of county level and higher structures

☐ **Mesoscale** - Simulation of links and zones (sub-county level structures)

**Input Database:**  ▼

☐ **Microscale** - Simulation of small, highly detailed structures

**Input Database:**  ▼

The user must choose a scale at which the model will operate. In fact, the scale chosen determines which geographic panel will be presented to the user and may affect the availability of other panels as well.

When the user selects “Mesoscale”, the “Input Database” controls for it are enabled. In order to use mesoscale, the user must provide a database with the links and zones that they may want to use. The geography panel(s) will let the user select a subset of those in the database, but the database must be provided.

Microscale operates similarly to Mesoscale with regard to the need for the user to supply input data that, in turn, provides bounds for geography (and perhaps time span) selections.

Currently, only the Macroscale option is available and is the default selection. When the Mesoscale and Microscale options are available there will be no default and the user must select one of the three scales available.

## 5. Macroscale Geographic Bounds

Region:	States:	Counties:	Selections:
<input type="radio"/> Nation	KENTUCKY	MICHIGAN - Schoolcraft County	MICHIGAN - Washtenaw County
<input type="radio"/> State	LOUISIANA	MICHIGAN - Shiawassee County	
<input checked="" type="radio"/> County	MAINE	MICHIGAN - St. Clair County	
	MARYLAND	MICHIGAN - St. Joseph County	
	MASSACHUSETTS	MICHIGAN - Tuscola County	
	MICHIGAN	MICHIGAN - Van Buren County	
	MINNESOTA	MICHIGAN - Washtenaw County	
	MISSISSIPPI	MICHIGAN - Wayne County	
	MISSOURI	MICHIGAN - Wexford County	

**Select All** **Add** **Delete**

The geographic selection must yield a list of county-state combinations for the model to be run at the Macroscale level. Selecting the Nation option under Region will be run the model for all county-state combinations. In this case the State, County, and Selection lists shown above are hidden, as there is nothing to select.

Running the model for all county-state combinations can take a long time so it is often better to run the model for a smaller set of county-state combinations. Selecting just the State Region allows the user to focus running the model for just a subset of states. The user can select the states in the State lists and click the Add button to add them to the selection. The model will be run for all county-state combinations within the states selected. The County list show above is not displayed when the State Region is selected.

Selecting the County Region allows the user to select individual counties within each state. The user must select a state in the State list to get a list of the counties for the state and then select the individual counties or use the Select All button to select all the counties for a state. The user then adds the selected county-state combinations to the Selection list by clicking the Add button. The user can then click on another state to select and add counties from that state. Note that the UI will not add a particular county-state combination to the Selection list more than once.

There is no default selection for the Macroscale Geographic Bounds panel and the model cannot be run without a selection on this panel.

## 6. Time Spans

The screenshot displays the 'Time Spans' GUI with four main sections: Years, Months, Days, and Hours.

- Years:** Includes a 'Year:' dropdown menu set to '2003', an 'Add' button, a 'Year:' text input field containing '2003', and a 'Remove' button.
- Months:** Features a grid of checkboxes for each month (January through December). 'January' is checked. Below the grid are 'Select All' and 'Clear All' buttons.
- Days:** Features a grid of checkboxes for each day of the week (Monday through Sunday). 'Monday' is checked. Below the grid are 'Select All' and 'Clear All' buttons.
- Hours:** Includes 'Start Hour:' and 'End Hour:' dropdown menus. 'Start Hour' is set to '00:00 - 00:59' and 'End Hour' is set to '01:00 - 01:59'. Below these are 'Select All' and 'Clear All' buttons.

Each RunSpec requires the user to select the time span over which to run the model. The user can select the years, months of the year, days of the week, and hours of the day to run the model for. The times selected are relative to the time zone so that 7:00 to 9:59 AM is 7:00 to 9:59 AM in each selected county-state combination.

The start and end time's resolution is hourly for Macroscale and Mesoscale. They can range from 00:00 – 00.59 and to 23:00 – 23:59.

It is not possible for a start and end time to include more than one day, for example, from 11:00 PM on Friday to 01:59 AM on Saturday. It is also not possible to run the model for months that overlap years. That is, the user cannot run the model for just December of 2003 through January 2004. However, the model can be run multiple times with different RunSpec time spans to accomplish these tasks.

There is no default selection for this panel and the model cannot be run without a selection on this panel.

## 7. On Road Vehicle Equipment

The screenshot shows a software interface for selecting on-road vehicle equipment. It consists of three main columns: 'Fuels:', 'Source Use Types:', and 'Selections:'. The 'Fuels:' column lists various fuel types, with 'Gasoline' selected. The 'Source Use Types:' column lists vehicle types, with 'Passenger Car' selected. The 'Selections:' column shows the resulting selection, 'Gasoline - Passenger Car'. Below the lists are three buttons: 'Select All' (under Fuels), 'Select All' (under Source Use Types), and 'Delete' (under Selections). A fourth button, 'Add Fuel/Type Combinations', is located below the 'Select All' buttons.

Fuels:	Source Use Types:	Selections:
Compressed Natural G...	Combination Commerci...	Gasoline - Passenger Car
Diesel Fuel	Combination Delivery Tr...	
Electricity	Interstate Bus	
Ethanol (E85 or E95)	Light Commercial Truck	
Gaseous Hydrogen	Motorcycle	
<b>Gasoline</b>	Motorhome	
Liquid Hydrogen	<b>Passenger Car</b>	
Liquid Propane Gas (LP...	Passenger Truck	
Methanol (M85 or M95)	Refuse Truck	

**Select All**      **Select All**      **Delete**

**Add Fuel/Type Combinations**

This panel allows the user to select which on road vehicles are to be modeled. The user must select from two distinct dimensions Fuels and Source Use Types.

Within the Fuel dimension, there is a list of Fuel Types. The Source Use Types dimension has the types of on road vehicles that can be modeled. The Select All button will select all Fuels or Source Use Types, respectively. Add Fuel/Type Combinations will add the combinations to the selection list. The “Delete” button will delete the selections from the selection list.

There is no default selection on this panel and the model cannot be run without a selection on this panel.

## 8. Road Type

The screenshot shows a software interface for selecting road types. On the left, under the heading "HPMS Road Types:", there is a list box containing the following items: Off-Network, Rural Interstate (highlighted), Rural Local, Rural Major Collector, Rural Minor Arterial, Rural Minor Collector, Rural Principal Arterial, Urban Collector, and Urban Freeway/Expressway. To the right of this list is a box labeled "Selected Road Types:" which currently contains "Rural Interstate". Below the list box are three buttons: "Select All", "Add", and "Delete".

The Road Type panel becomes available when the user selects any on-road vehicles to be modeled. All controls are disabled otherwise.

The list of HPMS Road Types is taken from a master list of roadway types in the database and is **not** filtered to only those roadway types actually present in the geographical range selected.

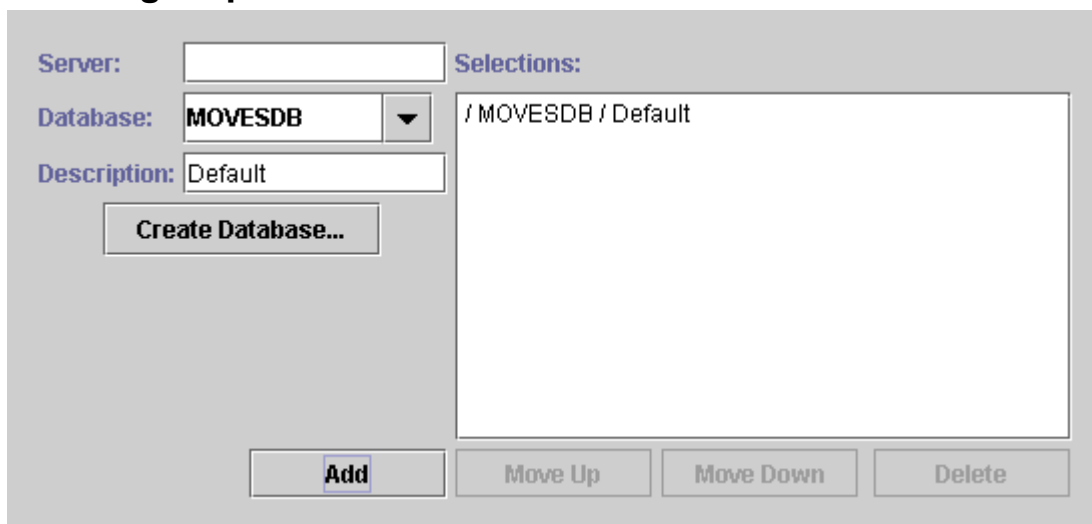
The model cannot be run without a selection on this panel if on-road vehicles have been selected.

## 9. Pollutants and Processes

	Extended Idle Exhaust	Manufacture/Disposal	Running Exhaust	Start Exhaust	Well-to-Pump
Atmospheric CO2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Carbon Equivalent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Fossil Fuel Energy Consumption	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Methane (CH4)		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Nitrous Oxide (N2O)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Petroleum Energy Consumption	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Energy Consumption	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Pollutant and Processes panel is used to denote which pollutants and processes the user wishes to have calculated by the model. It shows the relationship between pollutants and processes, and allows the user to perform single selections (via ☒).

## 10. Manage Input Data Sets



This panel is used to specify additional databases to be read by the model during execution. These databases must adhere to the MOVES schema and use the DBMS used by MOVES.

Users can create a new database on an existing local or remote server by using the Create Database button.

The data in these databases will “overlay”, that is augment or fully/partially replace, data from the MOVES default database for the duration of the model run. Thus, the order in which these databases are applied to the default data is important. The Move Up and Move Down buttons are used to modify the order in which a particular database selection is used. The Delete button is used to delete selections. Databases at the bottom of the list are applied last.

The databases specified on the Scale panel are input databases to the model and are required by the UI for running the model at the Mesoscale or Microscale scales. The Macroscale option uses the MOVES default database for input to the UI. The input databases on the Manage Input Data Sets panel are optional and are used only when the model is being executed. The input databases on the Scale panel are always read first followed by the selections on the Manage Input Data Sets panel.

The Add button adds a database to the input database selections after validating that the combination of server and database are unique within the selections. The same server-database combination cannot be added more than once.

There are no default selections for this panel and the model can be run without any selections on this panel.

## 11. Geographic Output Detail



The Geographic Output Detail panel sets the level of geographic detail used for the Location dimension of the output data. The number of output records generated is directly related to the level of detail chosen on this panel. For instance, should a user select “County”, the database will contain an aggregated record for each county (among other output dimensions of course). Information about the portions of Road Types contributing to the county total will not be available in the database. Choosing “County” will, however, still allow reporting to be further aggregated to the State and National levels.

For Macroscale operation, the “Link & Zone” option is disabled. Macroscale operation cannot calculate results by individual links within zones.

For Macroscale operation, the default on this panel is “County”. For Mesoscale operation, the default is “Link & Zone”. The model will run with the default if no other option is selected.

## 12. Output Emissions Breakdown

The screenshot shows a software interface for selecting output dimensions. It is divided into several sections:

- Always:** A group box containing three checked options: ☒ Time, ☒ Location, and ☒ Pollutant.
- for All Vehicle/Equipment Categories:** A group box containing four options: ☐ Model Year, ☒ Fuel Type, ☐ Emission Process, and ☐ Distinguish Particulates.
- Estimate Uncertainty:** A single option at the bottom left: ☐ Estimate Uncertainty.
- On Road/Off Road:** A large group box on the right containing:
  - ☒ On Road/Off Road (the top-level option for this section).
  - On Road:** A sub-group box containing:
    - ☒ Road Type
    - ☒ Source Use Type
    - ☐ SCC
  - Off Road:** A sub-group box containing:
    - ☐ Segment
    - ☐ SCC
    - ☐ HP Class

The Output Emissions Breakdown panel allows the user to select additional dimensions for the output data. The output data will always contain dimensions for time, location, and pollutant.

The dimensions that apply to both on-road and off-road sources are Model Year, Fuel Type, and Emission Process. The Distinguish Particulates option shown above is not an output dimension but actually causes the particulate pollutants to be reported as separate pollutants rather than as a single aggregate particulate count. Any combination of the All Vehicle/Equipment Categories dimensions may be selected.

Should the user decide to distinguish on-road sources from off-road sources, additional options become available. The On-Road options allow Road Type, MOVES Vehicle Type (Source Use Type), and SCC to be selected. Off-Road options allow Segment, SCC, and HP class to be selected. Each of these two groups has internal interdependencies between the allowed dimensions:

- Selecting the On Road/Off Road option allows the user to select from the individual On Road and Off Road dimensions. This selection is implied in the current MOVES implementation. If this option is de-selected, the output dimensions are just On Road and Off Road.
- Selecting the On Road/Off Road option, however, does not imply that any On Road or Off Road options must be selected.

- If On-Road SCC is used, Road Type and Fuel Type options will be selected and cannot be changed.
- Exactly zero or one of Off Road Segment and Off Road SCC may be selected.
- Off Road HP Class is independent of the other Off Road options.

The default on this panel is to use the implied “Time”, “Location” and “Pollutant” dimensions. The model can be run without user selections on this panel since there are always implied output dimensions.

## 13. General Output

This panel is conceptually the final panel completed prior to running the model.

The user must select the database into which the results should be placed. A default server may be shown (if not, localhost is used) but no default database is selected. The user must select the database name from databases on the current server or enter a new output database and press Create Database to create a new output database. If the output database already exists and contains rows within its output tables, a warning icon is displayed.

The Output Timestep is the “time” dimension of the output data. The setting for this value directly affects the number of output rows in the database. The options available for the Output Timestep are Hour, Day, Month, and Year. The default Output Timestep is Hour.

Various factors and values are available for each pollutant. The user can elect to have emission rates as a function of time output for each pollutant. The user can also elect to output emission rates as a function of distance (i.e. VMT related) output for each pollutant (This option is currently not available). Finally, the user can elect to simply get the total mass of pollutant output within each Output Timestep.

Choosing any of the Output factors or values requires the user to select appropriate units for their output. The units lists will be disabled if not required by the user's selections. Both common English and Metric units are available, thus making output in Tons per Kilometer possible (but not advisable) along with the more common Grams per Mile. Since it is only a rate, the Time Units list will include Year, Month, Week, Day, Hour, and Second regardless of the Output Timestep or time span durations. The user must select at least one of the Output factors or values.

The user must make appropriate selections in all areas of this panel, as the model cannot run without this information.

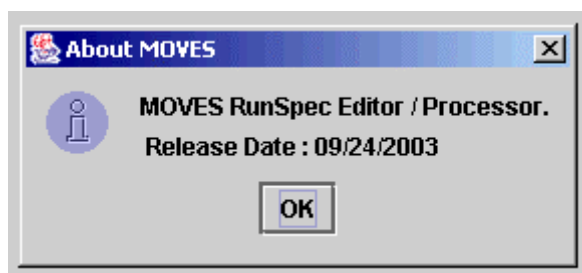
## 14. Additional Outputs



In addition to outputs for pollutants, MOVES can provide internal data used in its calculations. This panel is used to select which of those internal data sets should be provided.

## 15. Release Date

The release date of the model can be obtained by clicking “About MOVES” in the “Help” menu.



## 16. Other UI Notes

Buttons are used along with list boxes on most panels of the UI, typified by the “Select All”, “Delete”, and “Add” buttons. These buttons will be enabled/disabled based upon selection in their associated list box. For example, a “Delete” button will be disabled until a selection is made in its list box.

Though not shown here, during a model run, the user will be shown a progress indicator and be allowed to pause, resume, and cancel the run.

## **17. Revision History**

There are no prior versions of this document per se, but there are prior documents that describe the Greenhouse Gas-specific changes to the more general MOVES GUI documented by “MOVES RunSpec GUI Details r3.doc”